for stripping. The gum was softened and the epidermis, with the fiber attached to it, was readily removed by the fingers in strips or ribbons from the woody stem. Thus the process of decortication was accomplished in a few minutes, instead of requiring, as it sometimes does in the retting process, days and even weeks, and being at the best attended with uncertainty as to results, as is also the case when decortication is effected by machinery. Moreover, the retting process, which is simply steeping the cut stems in water, is a delicate operation, requiring constant watching, to say nothing of its serious inconvenience from a sanitary point of view, on account of the pestilential emanations from the retteries. By the Favier process it was estimated that the cost of producing the fiber ready for the scutching machine was not more than £2 per ton, which was said to be very low, but the author has no means of verifying this statement. The question of fuel for steam-raising does not arise, inasmuch as the woody stems can be used for that purpose after being stripped of the bark, if no other local source of fuel exists.

Thus the initial operation, so far, appeared to have been satisfactorily accomplished by M. Favier. In practice however, it was found that perfection was not reached The process certainly greatly simplified the commercial production of the fiber up to a certain point; for, at a very small cost, it gave the manufacturer the whole of the fiber contained in the stems treated. But still it stopped short of what was required, in that it delivered the fiber in ribbons with its cementitious matter and outer skin attached. To free the fibers from imprisonment various methods of treatment were proposed, and some were tried, but without absolute success, although success was often very closely approached. The gist of the matter was that the fiber could not always be produced of such a uniformly good quality as to constitute a commercially reliable article. Such was the position of the question in 1883, when it was taken up by a distinguished French chemist, the late professor Fremy, member of the Institute of France, who was well known for his researches into the nature of fibrous plants and the question of their preparation for the market. The professor thoroughly investigated the matter from a chemical point of view, and at length brought it to a successful and, apparently, a practical issue. One great bar to previous success appeared to have been the absence of exact knowledge as to the nature of the constituents of that portion of the rhea plant which contains the fiber, that is the casing or bark and its lining, which surrounds the woody stem. As determined by Prof. Fremy, this consists of the cutose, or outer skin, within which is the vasculose containing the fiber and other conjoined matter known as cellulose, between which and the woody stem is the pectose, or gum, which causes the skin or bark as a whole, fiber included, to adhere to the wood. The professor, therefore, proceeded to carefully investigate the nature of these various substances, and, as a result, he found that the vasculose and pectose were soluble in an alkali under certain conditions, and that the cellulose was insoluble. His method of procedure, therefore, was to dissolve out the cutose, vasculose, and pectose by a very simple process, obtaining the fiber clean and free from all extraneous adherent matter ready for the spinner. In order, however, to insure the production of a perfectly uniform and marketable article, the professor employed different chemicals at the several stages of the process. These chemicals, however, were not administered haphazard or by rule-of thumb, as had been previously done in some of the chemical processes bearing on the question, and which consequently failed in the sense that they did not take their places as commercial successes. The professor, therefore, carefully examined samples of the stems to be treated, and, according to the nature and character of the components of the mucilaginous matter, he determined the proportions of the various chemicals which he introduced at the several stages. All chance of failure thus appeared to be eliminated, and the production of a fiber of uniform and reliable quality was assumed to be removed from the region of doubt into that of certainty.

The principles just enunciated were carefully worked out into a system by Professor Fremy, in conjunction with M. Urbain, the professor's chief assistant in the Government Laboratory, Paris, where the author first went through the process experimentally with those gentlemen. Having sufficiently developed their invention, steps were taken to demonstrate its practicability on a fair working scale. The processes of M. Favier and MM. Fremy and Urbain were therefore combined, and a small plant was put up at experimental works in the Route d'Orleans, Grand Montrouge, just outside Paris. The process there carried out consisted in first treating the rhea stems according to M. Favier's invention, which has already been described. Decortication by steam having been effected, the work was taken up by MM. Fremy and Urbain. The ribbons having been produced, the fiber in them had to be freed from the surrounding mucilaginous secretions. To this end, after examination in the laboratory, they were laid on metal trays placed one above the other in a vertical perforated metal cylinder. When charged, this cylinder was placed within an iron cylinder containing a strong alkaline solution. Within the cylinder was a steam coil, and, steam having been turned on, the temperature was raised to a certain point, when the cylinder was closed and made steam tight. The process of boiling was continued under pressure until a high temperature, and consequently steam pressure was reached Upon the completion of this process, which occupied about four hours, the cementitious matter was found to be transformed into a substance which was very easy of solution. The fibrous mass was then removed to a centrifugal machine, in which it was rapidly freed from its surplus of alkaline moisture, after which it was placed in a weak solution of hydrochloric acid for a short time. It was then transferred to a bath of pure cold water, in which it was allowed to remain for about an hour, after which it was placed in a weak acid bath for a short time, and subsequently dried, being then ready for the spinner.

Continued working in the experimental factory at Montrouge, however, developed defects, and the system was found to be a little less than perfect. MM. Fremy